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PUB-NO: JP02000060857A
DOCUMENT-IDENTIFIER: JP 2000060857 A
TITLE: PROSTATE IMAGING INSTRUMENT AND PROSTATOMEGALY TREATING INSTRUMENT

PUBN-DATE: February 29, 2000

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INT-CL (IPC): A61B 8/12; A61M 25/00

ABSTRACT:

PROBLEM TO BE SOLVED: To provide a prostatomegaly treating device for identifying a degenerated tissue from the hardness distribution of the prostate and judging a therepeutic effect form the comparison of a degenerated part and a part to be treated.

SOLUTION: This device is provided with a catheter 2 with a balloon 3 to be inserted form the urethra of a subject, ultrasonic tomographic image parts 5 and 6 for inserting an ultrasonic probe 31 from the rectum 23 of the patient and tomographic images of the prostate 21, ultrasonic wave irradiation parts 5 and 6 for treating the hypertrophic of the prostate 21 by the irradiation of ultrasonic waves from the ultrasonic probe 31, a display part 4 for displaying the tomographic images and a control part 5 for controlling the operation of the catheter with the balloon and the the tomographic images. The size of the balloon is controlled, the prostate is pressurized from the urethra, the tomogram is imaged and the tomographic images before and after pressurization are displayed side by side at the display part. Thus, during prostate treatment by strong ultrasonic waves or after the treatment, the effect of the therapy is easily and accurately judged.

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Notes:
1. Untranslatable words are replaced with asterisks (****).
2. Texts in the figures are not translated and shown as it is.

Translated: 01:22:39 JST 05/15/2007
Dictionary: Last updated 05/11/2007 / Priority:

CLAIMS

[Claim(s)]

[Claim 1] The catheter with a balloon inserted from a **-ed person's urethra, and the ultrasonic tomogram image pick-up part which inserts an ultrasound probe from said **-ed person's rectum, and picturizes the tomogram for a prostate gland, Have the display part which displays said tomogram, and the control part which controls operation of said catheter with a balloon, and the image pick-up of said tomogram, control the size of said balloon, pressurize said prostate gland from said urethra, and said tomogram is picturized. The prostate gland imaging device characterized by displaying said tomogram before and behind pressurization on said display part side by side.

[Claim 2] The prostate gland imaging device characterized by having the picture comparing element which compares automatically said tomogram before and behind the pressurization displayed on said display part in a prostate gland imaging device according to claim 1.

[Claim 3] The catheter with a balloon inserted from a **-ed person's urethra, and the ultrasonic tomogram image pick-up part which inserts an ultrasound probe from said **-ed person's rectum, and picturizes the tomogram for a prostate gland, The ultrasonic irradiation part which treats hypertrophy of said prostate gland by irradiation of the ultrasonic wave from said ultrasound probe, Have the display part which displays said tomogram, and the control part which controls operation of said catheter with a balloon, and the image pick-up of said tomogram, control the size of said balloon, pressurize said prostate gland from said urethra, and said tomogram is picturized. The prostatic hypertrophy therapeutic device characterized by displaying said tomogram before and behind pressurization on said display part side by side.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] By the ultrasonic irradiation from the probe for medical treatment which passed through this invention and was inserted by the rectum, under medical treatment of prostatic hypertrophy, Or the probe for imaging which passed through the same after medical treatment and which was inserted by the rectum ([probes / the number of the probes inserted is one and] when the probe for medical treatment serves as the probe for imaging) the probe for medical treatment -- an imaging -- business -- the probe inserted when not serving as a probe -- two -- it is -- a treated area is observed on an ultrasonic B-mode image, and it is related with the equipment which judges a curative effect.

[0002]

[Description of the Prior Art] Conventionally, the prostate gland ultrasonic wave tomogram was picturized in the state where pressure is not put on a body tissue, and the curative effect was judged.

[0003] [the conventional technology 1 (Ultrasonic Imaging 13, pp.111-134 (1991))] An ultrasonic tomogram is picturized before and after the pressurization of a body tissue, the ultrasonic tomogram before and behind pressurization is compared, and it is indicated by the ultrasonic tomogram before pressurization that the hardness of an organization which cannot be observed is discriminable. That is, the algorithm which compares the tomogram before and behind that they compare the ultrasonic tomogram before and behind pressurization, and can identify a hard organization and a soft organization since how when pressurizing to be crushed differs between a hard organization and a soft organization, and pressurization, and judges hardness automatically from the crushing condition of an organization is indicated.

[0004] Using for the conventional technology 2 (U.S. Pat. No. 5676692) the catheter inserted into the urethra as an index with which the probe for medical treatment defines a focus is indicated.

[0005] The algorithm which compares the tomogram before and behind pressurization with the conventional technology 3 (IEEE UFFC, Vol.41, No3., and pp.314-325 (1994)), and judges hardness automatically using the cross correlation or SUPEKKURU tracking between tomograms from the crushing condition of an organization is indicated.

[0006]

[Problem to be solved by the invention] When there was no change in the prostate gland ultrasonic wave tomogram in the state where pressure is not put on a body tissue, before and behind medical treatment, a curative effect was not able to be authorized by the conventional method. Since it is indicated according to the conventional technology 1 that an ultrasonic tomogram is picturized before and after the pressurization of a body tissue, the ultrasonic tomogram before and behind pressurization is compared, and the hardness of an organization which cannot be observed by the ultrasonic tomogram before pressurization can be identified

When a difference arises in the hardness of an organization in the prostate gland before and behind medical treatment, the ultrasonic tomogram before and behind pressurization is compared, and the curative effect which is not known can be recognized by the ultrasonic tomogram before pressurization.

[0007] The purpose of this invention is to compare the ultrasonic tomogram before and behind the pressurization of a prostate gland, and to offer the prostate gland imaging device and prostatic hypertrophy therapeutic device which observe hardness change of the organization by the medical treatment which is not discriminable from the ultrasonic tomogram before pressurization.

[0008]

[Means for solving problem] The catheter with a balloon which inserts the prostate gland imaging device of this invention from a **-ed person's urethra, The ultrasonic tomogram image pick-up part which inserts an ultrasound probe from a **-ed person's rectum, and picturizes the tomogram for a prostate gland, It has the display part which displays a tomogram, and the control part which controls operation of a catheter with a balloon, and the image pick-up of a tomogram, and the size of a balloon is controlled, a prostate gland is pressurized from a urethra, a tomogram is picturized, and the tomogram before and behind pressurization is displayed on a display part side by side.

[0009] The catheter with a balloon which inserts the prostatic hypertrophy therapeutic device of this invention from a **-ed person's urethra, The ultrasonic tomogram image pick-up part which inserts an ultrasound probe from a **-ed person's rectum, and picturizes the tomogram for a prostate gland, The ultrasonic irradiation part which treats hypertrophy of a prostate gland by irradiation of the ultrasonic wave from an ultrasound probe, It has the display part which displays a tomogram, and the control part which controls operation of a catheter with a balloon, and the image pick-up of a tomogram, and the size of a balloon is controlled, a prostate gland is pressurized from a urethra, a tomogram is picturized, and the tomogram before and behind pressurization is displayed on a display part side by side. In the prostatic hypertrophy therapeutic device of this invention, the curative effect of the prostatic hypertrophy which was not able to be distinguished can be judged by the ultrasonic tomogram before pressurization.

[0010]

[Mode for carrying out the invention] Drawing 1 is the figure showing the example of composition of the prostate gland imaging device of the 1st example. As for a balloon and 4, in drawing 1 , the probe for imaging and 2 are [a control part and 6] ultrasonic tomogram image pick-up parts image display equipment and 5 a catheter with a balloon, and 3 1.

[0011] Drawing 2 is a figure explaining operation of the prostate gland imaging device of the 1st example. As for a prostate gland and 22, in drawing 2 , 20 is [the rectum and 24] seminal vesicles a urethra and 23 a bladder and 21. The catheter 2 with a balloon is inserted from a **-

ed person's urethra 22 to near the prostate gland 21. It is common for several days after medical treatment during the medical treatment of the prostate gland by a powerful ultrasonic wave to insert a catheter so that a urethra 22 may not be closed. In order to pressurize a prostate gland by a balloon 3 at the same time it puts the tip of a catheter 2 into a bladder, the balloon 3 is arranged at the side of the catheter 2 inserted in a urethra 22.

[0012] Drawing 3 is the figure showing the example of composition of the prostate gland ultrasonic therapy equipment of the 2nd example.

[0013] As for 7, in drawing 3 , the probe control part for medical treatment and 9 are piezo-electric elements the probe for medical treatment, and 8. The probe 7 for medical treatment is inserted in the rectum including the piezo-electric element 9 which is a fixed focus, and the piezo-electric element 9 irradiates the ultrasonic wave of the abbreviation frequency of 4MHz, and the intensity of several kW/cm2 to the treated area of a prostate gland, for example. The probe control part 8 for medical treatment controls movement of the probe 7 for medical treatment, the irradiation time of an ultrasonic wave, irradiation intensity, etc. In the portion in which the ultrasonic wave for medical treatment was fully irradiated, a body tissue denatures and the difference of hardness (elastic modulus) arises between the portions which are not irradiated. Medical treatment can be concluded to be a success if in agreement with the portion which wants to treat the prostate gland portion which denatured.

[0014] Drawing 4 is the figure showing the composition of the catheter with a balloon used with the prostate gland imaging device and prostatic hypertrophy therapeutic device of this invention. In drawing 4 , the air pipe with which 10 is connected to a balloon 3, and 11 are urine exhaust pipes which make urine discharge from a bladder. Air is taken to a balloon 3 through an air pipe 10, and the size of a balloon 3 is adjusted.

[0015] Drawing 5 is a figure explaining the outline of the method of discriminating a hard organization and a soft organization from comparison of the ultrasonic tomogram before and behind the pressurization by a balloon. In drawing 5 (a) and drawing 5 (b), the organization where 12 is hard, and 13 are soft organizations, and assume that the soft organization 13 has faced across the hard organization 12. Drawing 5 (a) shows the ultrasonic tomogram before pressurization, and drawing 5 (b) shows the ultrasonic tomogram after pressurization. Length pushed by L and pressurization in the thickness of each organization before pressurization is set to 2deltaL. The length of the whole organization after 3L and pressurization of the length of the whole organization before pressurization is 3L-2deltaL. Since the hard organization 12 cannot collapse easily when pressurized compared with the soft organization 13, thickness hardly changes before and after pressurization. On the other hand, in the soft organization 13, thickness changes with pressurization easily. Therefore, if the organization which compares the tomogram for an organization and is destroyed before and after pressurization, and the organization which is not destroyed are distinguished, hardness distribution of the whole

organization can be known. Since it was easy, in thickness change of the hard organization 12, in drawing 5 (b), 0 and thickness change of the soft organization 13 set to deltaL. Based on the above principle, by this invention, the ultrasonic tomogram for a prostate gland is compared before and after pressurization, hardness distribution of the whole prostate gland is investigated from the crushing condition of each organization, the portion which denatured is specified and a curative effect is judged.

[0016] In order to investigate hardness distribution with sufficient accuracy, it is necessary to pressurize a prostate gland from a near portion as much as possible. For example, by the method of pushing the abdomen directly, an excessive body tissue enters between a pressurization part and a prostate gland, and pressure does not get across to it effectively to a prostate gland. In this invention, it noted that it was common for several days after medical treatment during the medical treatment of the prostate gland by a powerful ultrasonic wave to insert a catheter so that a urethra may not be closed. Since the urethra adjoins the prostate gland, the pressurization from a urethra is the pressurization method most effective for investigating hardness distribution of a prostate gland. In this invention, the catheter 2 with a balloon is inserted in a urethra, the size of a balloon 3 is adjusted, and pressure is put on a prostate gland from a urethra. Imaging of the prostate gland before and behind pressurization is carried out in the ultrasonic tomogram image pick-up part 6. Operation of the catheter 2 with a balloon and the image pick-up by the ultrasonic tomogram image pick-up part 6 are controlled by the control part 5.

[0017] Drawing 6 is the figure showing the detailed example of composition of the prostate gland imaging device of the 1st example. As for a wave transmission circuit and 15, in drawing 6 , a machine control part and 17 are electronic control parts a wave-receiving circuit and 16 14. The ultrasonic tomogram image pick-up part 6 consists of a wave transmission circuit 14 and a wave-receiving circuit 15. The wave transmission circuit 14 gives a wave transmission pulse to the probe 1 for imaging, and the wave-receiving circuit 15 carries out phasing/adding of the wave-receiving signal from the probe 1 for imaging. The control part 5 consists of a machine control part 16 and an electronic control part 17. The machine control part 16 performs move control of the catheter 2 with a balloon, size control of a balloon 3, etc. The electronic control part 17 determines wave transmission focus distance, a transmission-and-reception wave caliber, etc., and controls the wave transmission circuit 14 and the wave-receiving circuit 15. The tomogram before the pressurization obtained in the ultrasonic tomogram image pick-up part 6 and the tomogram after pressurization are displayed on image display equipment 4.

[0018] The figure showing typically the example of the ultrasonic tomogram before and behind the pressurization by a balloon when drawing 7 is harder than a portion without denaturation of a denaturation portion, and drawing 8 are the figures showing typically the example of the

ultrasonic tomogram before and behind the pressurization by the balloon in the case of being softer than a portion without denaturation of a denaturation portion. Since drawing 7 and drawing 8 are easy, the picture of only a urethra and its circumference portion is shown, and 18 The tomogram before pressurization, The portion of other prostate glands and 29 are the circumference portions of a urethra the portion of the prostate gland which 19 denatured by the tomogram after pressurization and denatured by the ultrasonic irradiation for medical treatment 26, the portion of the prostate gland which does not denature by the ultrasonic irradiation for medical treatment 27, and 28. In drawing 7 and drawing 8 , the portion 26 of the prostate gland which denatured by the ultrasonic irradiation for medical treatment to the urethra up side, and the portion 27 of the prostate gland which does not denature by the ultrasonic irradiation for medical treatment are assumed. In addition, although it has not appeared in a tomogram, the balloon 3 is inserted into the urethra. [the tomogram before and behind pressurization when, as for drawing 7 , the portion 26 of the prostate gland which denatured by the ultrasonic irradiation for medical treatment becomes hard compared with the portion 27 of the prostate gland which does not denature by the ultrasonic irradiation for medical treatment, and drawing 8] It is a tomogram before and behind pressurization when the portion 26 of the prostate gland which denatured by the ultrasonic irradiation for medical treatment becomes soft compared with the portion 27 of the prostate gland which does not denature by the ultrasonic irradiation for medical treatment. By the tomogram 19 after pressurization, the balloon 3 in a urethra swells and a urethra 22 spreads. The user of equipment compares the portion 26 of the prostate gland which denatured by the ultrasonic irradiation for medical treatment of the tomogram 18 before pressurization, and the tomogram 19 after pressurization with the portion 27 of the prostate gland which does not denature by the ultrasonic irradiation for medical treatment.

[0019] Since the portion 27 of the prostate gland which does not denature by the ultrasonic irradiation for medical treatment is soft, the organization is destroyed by drawing 7 with the pressure from a urethra, but since the portion 26 of the prostate gland which denatured by the ultrasonic irradiation for medical treatment is hard, the organization is not destroyed. Since the portion 27 of the prostate gland which does not denature by the ultrasonic irradiation for medical treatment is hard, the organization is not destroyed by drawing 8 with the pressure from a urethra 22, but since the portion 26 of the prostate gland which denatured by the ultrasonic irradiation for medical treatment is soft, the organization is destroyed. An organization collapses and condition is information which is not acquired only from the tomogram 18 before pressurization. If the portion 26 of the prostate gland which denatured by the ultrasonic irradiation for medical treatment is in agreement with a portion to treat, it can be concluded that there was an effect of medical treatment. In addition, the combination of Still Picture Sub-Division of the tomogram 18 before pressurization and the tomogram 19 after

pressurization and an animation is arbitrary. For example, when displaying both by an animation, the animation of the tomogram 18 before pressurization is stored in image memory at the time of an image pick-up, next the tomogram 18 before the pressurization of image memory and the tomogram 19 after the pressurization under image pick-up are displayed side by side at the time of the image pick-up of the tomogram 19 after pressurization.

[0020] Drawing 9 is the figure showing the example of composition of the prostate gland imaging device of the 3rd example. In drawing 9 , the reference numbers 1-6 show the same contents of composition as the reference number shown in drawing 2 , and 30 is a picture comparing element. In the composition of drawing 2 , the picture comparing element 30 carries out the automatic judging of the hardness of each organization with the composition which shows drawing 9 the tomogram comparison before and behind the pressurization which the user of equipment was performing.

[0021] As for the composition of the picture comparing element 30, it is common to consider it as CPU or the computer which contained as a program the automatic diagnosis currently indicated by the conventional technology 1 and 3. The picture comparing element 30 carries out imaging of the hardness distribution of an organization, after judging the hardness of each organization automatically from the tomogram comparison before and behind pressurization. When the composition shown in drawing 9 performs an automatic judging It is not necessary to display simultaneously both the tomogram 18 before pressurization, and the tomogram 19 after pressurization on image display equipment 4. For example, it is possible to indicate the picture of the hardness distribution which indicated the tomogram 18 before pressurization and the picture of the hardness distribution for which the picture comparing element 30 asked by parallel or for which the tomogram 19 and the picture comparing element 30 after pressurization asked by parallel. It is also possible to pile up and display the picture of the hardness distribution for which the picture comparing element 30 asked on the tomogram 18 before not a parallel display but pressurization or the tomogram 19 after pressurization.

[0022] It assumed performing the judgment of the curative effect by irradiation of the ultrasonic wave for medical treatment of the prostate gland described above after the ultrasonic irradiation for medical treatment. If the judgment of a curative effect can be performed during medical treatment, when the effect of the ultrasonic irradiation for medical treatment will be checked, the ultrasonic irradiation for medical treatment can be ended immediately. That is, a curative effect is judged during medical treatment and the judgment which was able to be obtained can be used as terminal point detection of the ultrasonic irradiation for medical treatment.

[0023] Drawing 10 is the figure showing the example of composition of the ultrasonic prostate gland therapeutic device of the 4th example. Drawing 10 shows the example of composition of the equipment in which the effect judging under medical treatment is possible, the reference

numbers 1-6 show the same contents of composition as the reference number shown in drawing 2 in drawing 10 , and 31 is a probe which serves both as an imaging (image pick-up) and medical treatment. [the composition of the probe 31 which serves both as imaging and medical treatment] for example, when the same as that of the probe 7 for medical treatment shown in drawing 3 , in using it as a probe for medical treatment (at the time of the ultrasonic irradiation for medical treatment) In driving the piezo-electric element 9 and using it as a probe for imaging by the intensity of center frequency [of about 4MHz], and intensity several kW/cm2 (at the time of a dislocation image pick-up), it drives a piezo-electric element by the center frequency of about 4MHz, and about 1 / ten or less intensity of the intensity of the ultrasonic irradiation for medical treatment. In the ultrasonic irradiation for medical treatment, the piezo-electric element 9 is used only for wave transmission, and the piezo-electric element 9 is used for a transmission-and-reception wave at the time of a dislocation image pick-up. In drawing 10 , the control part 5 has the function of the probe control part 8 for medical treatment shown in drawing 3 , the machine control part 16 shown in drawing 6 , and the electronic control part 17. Namely, the move mechanism of the probe 31 which serves both as imaging and medical treatment, irradiation time of a medical treatment ultrasonic wave, Move control of the catheter 2 with a balloon, size control of a balloon 3, etc. are performed, further, wave transmission focus distance, a transmission-and-reception wave caliber, etc. are determined, and the ultrasonic tomogram image pick-up part 6 is controlled at the same time it controls irradiation intensity etc. In drawing 10 , comparison of the image pick-up of the tomogram after irradiation of the ultrasonic wave for medical treatment, the image pick-up of the tomogram before pressurization, the pressurization by a balloon, and pressurization and the tomogram before and behind pressurization is performed in order. Comparison of the tomogram image pick-up after irradiation of the ultrasonic wave for medical treatment, the tomogram image pick-up before pressurization, the pressurization by a balloon, and pressurization and a tomogram is repeated until the denaturation portion which became clear from comparison of the tomogram is in agreement with a portion to treat.

[0024] Drawing 11 is the figure showing the example of composition of the imaging used with the ultrasonic prostate gland therapeutic device of the 4th example of an example, and the probe which serves both as medical treatment. In drawing 11 , the piezo-electric element for medical treatment which uses 32 at the time of the ultrasonic irradiation for medical treatment, and 33 are piezo-electric elements for imaging used at the time of a dislocation image pick-up. [the piezo-electric element 32 for medical treatment, and the piezo-electric element 33 for imaging] It is arranged at the both sides of the probe 31 which serves both as imaging and medical treatment, and at the time of the ultrasonic irradiation for medical treatment The piezo-electric element 32 for medical treatment is turned to the direction of radiation of the ultrasonic wave for medical treatment, at the time of a dislocation image pick-up, the probe 31 which

serves both as imaging and medical treatment is rotated 180 degrees, and the piezo-electric element 33 for imaging is turned to a direction of radiation. At the time of medical treatment, a probe is driven by center frequency [of an ultrasonic wave / of 4MHz], and intensity several kW/cm2, it is considered as the center frequency of 4MHz at the time of photography, and intensity is made or less [at the time of medical treatment] into 1/10. In addition, it is good in the center frequency of the ultrasonic wave at the time of medical treatment also considering the center frequency at the time of 4MHz and photography as about 7MHz.

[0025] Drawing 12 is a figure which illustrates the image pick-up method of the tomogram before and behind pressurization with being **** for twisting for comparison of the tomogram before and behind pressurization more effectively in the ultrasonic prostate gland therapeutic device of the 4th example of an example. Drawing 12 is the figure which looked at the imaging shown in drawing 11 , and the probe 31 which serves both as medical treatment from the front. In drawing 11 , 34 is the image pick-up side of the tomogram before and behind pressurization, and 35 is the image pick-up side of the tomogram after pressurization. The image pick-up side of each tomogram presupposes that it is perpendicular to the space of drawing 12 .

[0026] When the tomogram comparison before and behind pressurization investigates hardness distribution of an organization, as shown in drawing 7 and drawing 8 , it is required to have reflected the same organization as the tomogram before and behind pressurization. However, comparison becomes impossible, when the tomograms before and behind pressurization were collected in respect of the same image pick-up and it shifts from the image pick-up side of the tomogram before an organization pressurizing by pressurization. In the example shown in drawing 12 , since the tomograms before pressurization are collected in respect of [34] an image pick-up and the tomograms after pressurization are collected in respect of three image pick-ups of the image pick-up side 34 and the image pick-up side 35, also when the organization reflected to the tomogram before pressurization shifts from the image pick-up side 34 by pressurization, it can respond. In the example shown in drawing 12 , although the image pick-up side of the tomogram after pressurization was made into three image pick-up sides, it does not restrict to this. [change / the probe 31 which serves both as imaging and medical treatment is rotated mechanically, and / when collecting two or more image pick-up sides shown in drawing 12 / an image pick-up side] Or using the piezo-electric element 33 for imaging arranged to two dimensions, two or more elements carry out electronic control of the drive timing of each two or more elements, and the ready ******, and change an image pick-up side.

[0027]

[Effect of the Invention] As explained above, according to this invention, the effect judging of medical treatment does so the prominent effect of being correctly [simply and] realizable, by comparing the tomogram before and behind the pressurization by a balloon, and investigating

hardness distribution of an organization during the prostate gland medical treatment by a powerful ultrasonic wave, or after medical treatment.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The figure showing the example of composition of the prostate gland imaging device of the 1st example of this invention.

[Drawing 2] The figure explaining operation of the prostate gland imaging device of the 1st example of this invention.

[Drawing 3] The figure showing the example of composition of the prostate gland ultrasonic therapy equipment of the 2nd example of this invention.

[Drawing 4] The figure showing the composition of the catheter with a balloon used with the prostate gland imaging device and prostatic hypertrophy therapeutic device of this invention.

[Drawing 5] The figure which illustrates the outline of the method of discriminating a hard organization and a soft organization from comparison of the ultrasonic tomogram before and behind pressurization, in the example of this invention.

[Drawing 6] The figure showing the detailed example of composition of the prostate gland imaging device of the 1st example of this invention.

[Drawing 7] The figure showing typically the example of the ultrasonic tomogram before and behind the pressurization by the balloon in the case of being harder than a portion without denaturation of a denaturation portion in the example of this invention.

[Drawing 8] The figure showing typically the example of the ultrasonic tomogram before and behind the pressurization by the balloon in the case of being softer than a portion without denaturation of a denaturation portion in the example of this invention.

[Drawing 9] The figure showing the example of composition of the prostate gland imaging device of the 3rd example of this invention.

[Drawing 10] The figure showing the example of composition of the ultrasonic prostate gland therapeutic device of the 4th example of this invention.

[Drawing 11] The figure showing the example of composition of the imaging used with the

ultrasonic prostate gland therapeutic device of the 4th example of the example of this invention, and the probe which serves both as medical treatment.

[Drawing 12] The figure which illustrates the image pick-up method of the tomogram before and behind the pressurization for comparing the tomogram before and behind pressurization more effectively in the ultrasonic prostate gland therapeutic device of the 4th example of an example.

[Explanations of letters or numerals]

1 -- The probe for imaging, 2 -- A catheter with a balloon, 3 -- Balloon, 4 [-- The probe for medical treatment,] -- Image display equipment, 5 -- A control part, 6 -- An ultrasonic tomogram image pick-up part, 7 8 [-- Urine exhaust pipe,] -- The probe control part for medical treatment, 9 -- A piezo-electric element, 10 -- An air pipe, 11 12 [-- Wave-receiving circuit,] -- A hard organization, 13 -- A soft organization, 14 -- A wave transmission circuit, 15 16 [-- The tomogram after pressurization,] -- A machine control part, 17 -- An electronic control part, 18 -- The tomogram before pressurization, 19 20 [-- The rectum, 24 / -- Seminal vesicle,] -- A bladder, 21 -- A prostate gland, 22 -- A urethra, 23 26 -- The portion of the prostate gland which denatured by the ultrasonic irradiation for medical treatment, 27 -- The portion of the prostate gland which does not denature by the ultrasonic irradiation for medical treatment, 28 [-- The probe, 32 which serve both as imaging and medical treatment / -- The piezo-electric element for medical treatment 33 / -- The piezo-electric element for imaging 34 / -- The image pick-up side of the tomogram before and behind pressurization, 35 / -- Image pick-up side of the tomogram after pressurization.] -- The portion of other prostate glands, 29 -- The circumference portion of a urethra, 30 -- A picture comparing element, 31

[Translation done.]